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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,169	02/27/2004	Jun Wang	V9661.0056	4887

32172 7590 08/17/2007
DICKSTEIN SHAPIRO LLP
1177 AVENUE OF THE AMERICAS (6TH AVENUE)
NEW YORK, NY 10036-2714

EXAMINER

RAYMOND, BRITTANY L

ART UNIT	PAPER NUMBER
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1756

MAIL DATE	DELIVERY MODE
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08/17/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/787,169	Applicant(s) WANG ET AL.	
	Examiner Brittany Raymond	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7,9,10,12 and 15-20 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7,9,10,12 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 7 and 15 are objected to because of the following informalities: Claim 7 contains the word "forth" in lines 17 and 19, which is misspelled. The correct spelling is "fourth." Claim 15 should have the word "is" between "(real or assist features)...less than the minimum pitch". Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 12 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 12 and 15 are dependent on claims 11 and 14, respectively, which have been canceled.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 7, 9, 10, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pforr (U.S Patent 6627392) in view of Baselmans (U.S. Patent Publication 2005/0136340).

Pforr discloses a process of forming two masks from a denser patterned mask and imaging each mask pattern onto a substrate one after another (Column 4, Lines 15-23), as recited in claim 7 of the present invention. It is apparent from Figures 1 and 2 that features are placed onto a dense grid with rows and columns and the grid is split up into two sparser grids, one containing the first and fourth subsets of features and the other containing the second and third subsets of features, as described in claim 7 of the present invention. Pforr states that the original pattern has high-density structural detail (Column 1, Lines 58-67), which is equivalent to saying the circuit area is minimized, as recited in claim 9 of the present invention.

Pforr fails to disclose that assist features are added to the grid points and that they are placed on the grid points that do not have real features on them, that the assist features are sized so that they do not print but allow illumination to be optimized, and that the distance between two adjacent real features and the distance between two adjacent features is no less than minimum pitch of single-exposure lithography.

Baselmans discloses a method of making a mask comprising: defining a plurality of pattern features and a plurality of assist features, each at selected locations

(Paragraph 0023), as recited in claim 7 of the present invention. It is apparent from Figures 3 and 4 that the features are placed on a grid with even and odd-number columns and rows (first-fourth subsets as described in the claims of the present invention), and are spaced in a certain way or have particular grid pitches, as recited in claim 7 of the present invention. Figures 3 and 4 also show that the assist features are introduced at locations, 151, 152, etc., that do not have pattern features, as recited in claim 10 of the present invention. Baselmans also discloses that the assist features are not intended to appear in the pattern developed in the resist, but are used to improve the image (Paragraph 0019), as recited in claim 7 of the present invention. Baselmans states that a beam is projected through the mask to form a pattern on a substrate (Paragraph 0003), as recited in claim 7 of the present invention. Since only one exposure is being performed through one mask, the features must be spaced so that the distance between two adjacent real features and the distance between two adjacent features is no less than minimum pitch of single-exposure lithography, as recited in claims 12 and 15 of the present invention.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have included sub-resolution assist features in the dense pattern of Pforr, as suggested by Baselmans, because Baselmans teaches that assist features allow for the pattern features to have improved critical dimensions.

Response to Arguments

6. Applicant's arguments, filed 6/12/2007, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, due to applicant's

amendments, a new ground(s) of rejection is made in view of a newly found prior art reference.

Examiner has included the reference, Pforr, to teach the formation of two sparse masks from one dense mask containing a grid of pattern features. The two masks are exposed one after another to form the dense pattern onto a substrate.

The reference, Baselmans, is being used to teach the use of assist features in the dense grid pattern of Pforr.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-


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6545. The examiner can normally be reached on Monday through Friday, 8:00 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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MARK E. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700